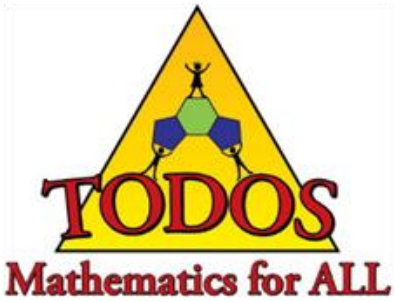

Centering Culture, Language, and Identity in a History of Mathematics Course for Preservice Teachers

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Abstract

This article presents the redesign of an undergraduate History of Mathematics course for preservice teachers at a Hispanic-Serving Institution. Grounded in Community- and Family-Centered Pedagogy (CFCP) and Marshall's framework for culturally sustaining mathematics teaching, the course intentionally moved beyond Eurocentric narratives to center students' linguistic, familial, and cultural resources as integral to mathematical meaning-making. Two core assignments anchored the redesign: (1) evolving Padlet reflections that connected global mathematical histories to students' family and community practices, and (2) bilingual *Cuentos Matemáticos* that wove mathematical concepts with personal and cultural narratives in English and Spanish. Selected student reflections illustrate how these experiences created opportunities for students to express pride, connection, and agency as learners of mathematics and as future teachers. The redesign offers one example of how content courses can position mathematics as both a cultural and intellectual endeavor while supporting more affirming and inclusive approaches to teacher preparation.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. Have you ever seen your family's everyday practices (e.g., cooking, building, budgeting) as mathematical? Why or why not?

2. What kinds of personal or community resources might students draw upon to make sense of mathematics?

3. How might everyday family or community activities reveal mathematical thinking?

4. How might mathematics learning change when students' languages, cultures, and identities are affirmed in the classroom?

5. How can an instructor sustain students' languages and cultures in the mathematics classroom rather than simply acknowledging them?

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Centering Culture, Language, and Identity in a History of Mathematics Course for Preservice Teachers

Luis Miguel Fernández and Tenchita Alzaga Elizondo

"*Para mí fue un momento de orgullo aprender cómo mi cultura, a través de los aztecas y los mayas, ayudó a influir en la actualidad de las matemáticas*." – Laura

Mathematics courses in the United States often emphasize Eurocentric figures and developments, frequently highlighting Greek geometry, Newtonian calculus, and Gaussian number theory (Ernest, 2021; Rowlands & Carson, 2000). Although these courses may occasionally reference non-Western mathematical contributions, rarely do they reflect or validate the lived experiences, home languages, or community-based knowledge systems of the actual students in the room, particularly students from historically marginalized backgrounds (Moreno & Moreno, 2021). This gap is especially important in teacher preparation, where preservice teachers are not only learning mathematics but also developing ideas about what counts as mathematics, whose knowledge is valued, and how mathematics can be taught.

History of Mathematics courses offer one promising space for addressing this issue. Prior scholarship suggests that learning mathematics through historical perspectives can support preservice teachers' content and pedagogical knowledge (Clark, 2012; Furinghetti, 2007; Galante, 2014), provide preservice teachers with new ideas and perspectives for instruction (Furinghetti, 2007; Youchu, 2016), and increase preservice teachers' motivation and interest in learning mathematics (Charalambous et al., 2009; Liu, 2003; Schubring et al., 2000). These benefits are often attributed to the ways historical perspectives can humanize mathematics by helping students see mathematics as a field shaped by people, questions, struggles, and cultural contexts rather than as a collection of fixed truths (Barbin et al., 2002; Schubring et al., 2000). This is not always the case, however, as scholars have also found that preservice teachers can also leave history of mathematics courses feeling even more disconnected from the topic, failing to see their struggles as akin to those of historical mathematicians (Charalambous et al., 2009).

This article presents a practice-based, expository account of a redesigned undergraduate History of Mathematics course for 6th–12th grade preservice teachers at a Hispanic-Serving Institution in the southwestern United States. The course served a predominantly Latino, bilingual, and first-generation student population and carried an official English-Spanish bilingual designation. Rather than critiquing mathematics as a discipline, the redesign responded to dominant ways of presenting mathematical history that can privilege Eurocentric, monolingual, and decontextualized narratives. In this article, we focus on two central assignments, Padlet reflections and *Cuentos Matemáticos*, as illustrative examples of how the course invited students to examine whose mathematical knowledge is centered, how mathematics connects to lived experience, and how future teachers might draw on students' cultural and linguistic

resources in their own classrooms. Selected student responses are included not as systematically analyzed findings or generalized evidence of impact, but as examples of the cultural, linguistic, and mathematical connections that emerged through the course. We conclude by presenting student reflections that illustrate important outcomes of the course redesign.

Guiding Frameworks

The course redesign was grounded in Community- and Family-Centered Pedagogy (CFCP; Ramirez et al., 2024), an approach that centers reciprocal relationships among classrooms, families, and communities and treats family and community knowledge as central to learning rather than as supplemental context. In mathematics education, this means recognizing that mathematical thinking can emerge through everyday practices such as measuring, counting, building, cooking, budgeting, storytelling, and navigating family or community responsibilities. In this course, CFCP shaped the assignment structure by inviting preservice teachers to interview relatives or close community members, respond to community-based prompts, and connect everyday family and community practices to mathematical ideas.

Marshall's (2023) framework for culturally sustaining mathematics teaching provided a complementary pedagogical lens for interpreting and valuing those connections. We use culturally sustaining in line with Marshall's mathematics-specific framing in that instruction should not only connect mathematics to students' lives, but also sustain students' linguistic, cultural, familial, and community-based ways of knowing as legitimate resources for mathematical meaning-making. To this end, Marshall's (2023) framework includes four overlapping but distinct dimensions: Anti-Assimilationism, which focuses on resisting classroom norms that pressure students to leave behind their languages, cultural practices, or ways of participating in order to be viewed as successful in mathematics; Strength-Based Teaching, which focuses on how instruction identifies, uses, and builds from students' existing cultural, linguistic, familial, community, and mathematical knowledge as resources for learning; Power and Justice, which focuses on how mathematics, schooling, and historical narratives legitimize some forms of knowledge while marginalizing others, and how mathematics can be used to examine inequity; and Identity Affirmation, which focuses on how students are recognized and positioned as mathematically capable people whose cultural, linguistic, and mathematical identities belong within mathematics. These dimensions overlap in practice, but they foreground different questions: what resources are used for learning, whose ways of being are sustained, whose knowledge is legitimized, and how students are positioned in relation to mathematics.

Together, these two frameworks created a productive tension that resonates with Gutiérrez's (2013) framing of the dominant and critical axes of mathematics education. On one hand, the course had to "play the game" by engaging preservice teachers with canonical mathematical histories and disciplinary knowledge, material that remains central to institutional definitions of mathematics. On the other hand, it sought to "change the game" by centering the preservice teachers' lived experiences, languages, and cultural practices as equally valid sources of mathematical knowledge and identity. Holding these commitments together reflected the course's broader equity orientation: preparing students to succeed within dominant systems while also reimagining mathematics as a cultural, relational, and justice-oriented practice.

Two Central Assignments: Padlet Reflections and Cuentos Matemáticos

Padlet Reflections

In this course, Padlet.com, a shared digital board for posting text, images, videos, and comments, served as the hub for weekly reflections tied to mathematics history topics. Each week, students co-presented historical themes that included both canonical European figures and contributions from Mesoamerican traditions, particularly Aztec and Mayan mathematics. By broadening the historical lens, the course invited preservice teachers to view mathematics as a multicultural human endeavor and to connect course content to cultural, linguistic, and community knowledge.

Shortly after each weekly student presentation, the first author posted a Padlet homework prompt designed to extend the historical theme into students' family and community contexts. For each prompt, preservice teachers were asked to (1) interview a relative or close community member using questions aligned with the weekly topic, (2) create a short video diary retelling their interviewee's story and linking it to the week's mathematical theme in the language or languages of their choice, and (3) engage with at least five classmates' posts. In doing so, the weekly homework activities flowed from classroom exploration to family narratives and back into the shared digital space.

Each week's prompt was developed iteratively, with one primary dimension of Marshall's (2023) framework serving as the instructor's intended emphasis (see Table 1). As preservice teachers engaged with the prompts through family interviews and video diaries, however, their responses often moved beyond that initial emphasis, highlighting the overlapping nature of Marshall's (2023) framework through their own stories, examples, and interpretations. In this sense, Table 1 identifies the instructor's intended primary dimension for each prompt while also presenting one enacted version of the course. Different students, family stories, and classroom conversations may lead other classes to foreground different prompts, dimensions, and students' examples.

Table 1

A summary of the weekly topics, family prompts, and their alignment with Marshall's (2023) framework.

Weekly topic	Historical focus	Family/community prompt (summarized)	Primary intended dimension*
Babylonian & Egyptian Mathematics	Counting systems, record-keeping	Ask a family member to share "non-traditional" methods they use for counting, measuring, or keeping records (e.g., tally marks, steps, household systems). Reflect on how these practices demonstrate intellectual resources comparable to Babylonian or Egyptian methods.	**Strength-Based:** foregrounds family and community strategies as mathematical resources.
Pythagoras' Theorem & Euclid's Elements	Numbers, patterns, sequences	Explore family traditions or beliefs involving numbers or patterns (e.g., lucky numbers, weaving, the number 15 in *quinceañeras*). Discuss how these traditions connect to broader cultural meanings of numbers, affirming them alongside Greek numerology.	**Strength-Based:** builds from existing cultural and practical knowledge.
The Concept of Zero	Origins and meaning of zero	Gather family stories, rituals, or practices connected to nothingness. Analyze how these narratives parallel the mathematical role of zero, showing that cultural worldviews also embody mathematical concepts.	**Identity Affirmation:** invites students to connect mathematical meaning to family stories and cultural interpretation.
Al-Khwarizmi & Muslim Art	Algebra, symmetry, tessellations	Document a family or cultural art tradition (e.g., embroidery, tilework, craft design) that uses geometry or symmetry. Explain how these practices reveal artistry as a form of algebraic and geometric reasoning.	**Strength-Based:** treats artistic and cultural practices as mathematically meaningful
The Mayans & their Codex	Knowledge preservation	Compare the Mayan use of codices to ways your family preserves mathematical knowledge (e.g., oral storytelling, photo albums, religious texts, heirlooms). Reflect on why these practices should be valued as intellectual traditions.	**Anti-Assimilationism:** resists narrow definitions of legitimate knowledge preservation.
Fibonacci's Sequence	Cultural exchange, numeral systems	Interview a family member about a journey, migration, or cultural exchange. Connect their experiences to Fibonacci's travels, showing how movement across cultures enriches mathematical knowledge.	**Strength-Based:** treats family histories of movement and exchange as resources for understanding how mathematical ideas travel.

Weekly topic	Historical focus	Family/community prompt (summarized)	Primary intended dimension*
Da Vinci & the Golden Ratio	Symmetry, geometry in art	Share a family artwork, textile, or crafted object with a geometric or symmetrical design. Identify the mathematical patterns it embodies, affirming these creations as legitimate contributions to mathematical reasoning.	**Strength-Based:** validates family creativity and design as mathematical resources.
The Copernican Revolution & Galileo's Trial	Shifts in worldview	Reflect on a family mathematical belief, value, or tradition that has changed over time due to new knowledge or perspectives. Connect these shifts to the Copernican Revolution, analyzing the power relations involved in challenging established views.	**Power and Justice:** foregrounds authority, legitimacy, and whose knowledge is accepted or challenged.
The Aztecs & their Calendar System	Calendrical systems, cycles	Ask family members about the mathematics they use to track important dates (e.g., holidays, harvests, work schedules). Reflect on how these practices show control of time and cycles. Then consider how some systems (e.g., Gregorian calendar, school schedules) were imposed over community-based calendars such as the Aztec's.	**Anti-Assimilationism:** recognizes community-based systems of timekeeping without treating dominant calendar systems as the only legitimate form.
Newton & Leibniz (Calculus Wars)	Intellectual rivalry, recognition	Ask about a family or community rivalry/competition that involved quantitative comparison (e.g., sports scores, production goals, academic achievements), and how this led to growth or recognition, paralleling the Newton–Leibniz dispute.	**Power and Justice:** foregrounds recognition, authorship, and whose contributions are legitimized.
Euler's Formula	Harmony, rhythm, cycles	Investigate music or dance traditions in your family. Identify rhythmic, cyclical, or symmetrical patterns and relate them to Euler's ideas of harmony and cycles.	Strength-Based: treats music and dance traditions as resources for mathematical meaning-making.

* In Marshall's (2023) framework for culturally sustaining mathematics

As a course design feature, the Padlet reflections offered one way to put the guiding frameworks into practice. The family interview component reflected CFCP (Ramirez et al., 2024) by positioning relatives and close community members as sources of mathematical knowledge. By semester's end, the Padlet served as a course archive of voices, perspectives, and connections that illustrated mathematics as lived, relational, and culturally situated. Figure 1 contains a screenshot of the Padlet space, blurred out to maintain student anonymity.

In what follows, we highlight selected tasks and student work to illustrate how the course created opportunities for preservice teachers to connect mathematical history with family, community, language, and identity. We selected examples that made visible the kinds of cultural, linguistic, familial, and mathematical connections the assignments were designed to invite, making note of the connection to Marshall's framework. These examples are not intended as formal coding categories or evidence of generalized outcomes. Rather, they illustrate how Marshall's (2023) framework informed the design and interpretation of classroom activities, while recognizing that students may have understood their experiences through different lenses and that any single response could reflect more than one dimension at once.

Noticing Mathematics in Family and Community Practices

Early prompts asked preservice teachers to introduce a relative and anticipate where mathematics might surface in their relative's daily lives. These reflections often revealed practices such as cooking, games, and religion, positioning

mathematics as cultural, practical, and deeply embedded in everyday activity. Drawing on these reflections, and using pseudonyms to protect participants' identities, Carolina described how *rosarios* are used in Catholic rituals following a death and how numbers carry special significance:

> *Cuando alguien muere, lo que hacemos es usar un rosario, que ahora que lo pienso es un patrón de números en específico…es un novenario…es que rezamos el rosario por nueve días después de la muerte del familiar… después, rezamos con las cuentas, son 50…el número 50 son los 50 pasos que damos hacia el Cielo, hacia Dios*.

Similarly, Sofía interviewed her father and highlighted how, as a child, he used his hands to measure *chemas* while playing marbles:

> When playing *canicas*, he measured in *chemas*, and that's the distance between your pinky and your thumb. I think it was an easy way to measure as a child, but also pretty advanced since it has to do with proportions, like in geometry.

These narratives illustrate how students identified mathematical ideas within practices their families already knew and used. In both cases, the mathematical insight did not originate from formal instruction alone but from family, religious, and community-based activity. Through Marshall's (2023) framework, these examples can be understood as reflecting strength-based teaching because they foreground family and community knowledge as mathematical resources. At the same time, they may also carry elements of identity affirmation, especially when students recognize value in practices connected to their families and cultures.

Figure 1

Sample Screenshot from the Padlet Digital Space

Connecting Mathematics to Cultural Practices and Personal Meaning

Later prompts encouraged preservice teachers to take more interpretive stances, moving beyond identifying where mathematics appeared in their relatives' daily lives to exploring how their own cultural practices embodied

mathematical meaning. Reflections on embroidery, music, and dance revealed how some students described connections between mathematics and cultural practices that were meaningful to them. One preservice teacher's video demonstrated how her aunts and great-grandmother created cross-stitch patterns on small handkerchief-like pieces of cloth, which were used as *recuerdos* for *quinceañera* and other family celebrations. Carolina explained:

> They used to *bordar y tejer, bordar y tejer*. They would use patterns like this [shows example of a handkerchief-like piece of cloth]. As you can see, it says *Mis Quince*. It's a *recuerdo*. They are full of patterns; each letter is made up of tiny x's that you can count. The number of x's tells you how many stitches you go in and out, *derechos y reversos*. It's like measuring with numbers. You also want to keep it symmetrical so that it looks nice. We keep these as *recuerdos* of the event.

Andrea also connected her family's Cuban styles of dancing to fractional divisions of rhythm:

> *En Cuba, se usa mucho todavía el paso de tres, como la bachata. Muchos pasos son pasos de tres. Mi mamá me dijo que ella iba mucho a los bailes de pasos de tres. Siento que es algo muy interesante porque en folklórico uso mucho los pasos de ocho y en flamenco los pasos de doce. Los números son muy importantes para bailar. Como cultura, es hermoso cómo los números se juntan con el arte*.

These narratives show how students positioned mathematics as connected to who they are, where they come from, and the cultural practices that shape their family lives. In both cases, mathematics was interpreted through cultural practices that carried personal and familial meaning. Through Marshall's (2023) framework, these examples can be read as reflecting identity affirmation because students connected mathematics to cultural belonging and self-understanding. They also reflect strength-based teaching because they identify cultural practices as mathematical resources.

Recognizing Mathematical Knowledge Beyond Formal Schooling

Other prompts focused on structural issues such as access to education and migration experiences. One student recounted how her father, despite struggling with formal mathematics, demonstrated strong mathematical reasoning in his work as a truck driver and construction worker, using his body and environment as intuitive measuring tools. Sofía shared:

> He [father] told me he did not complete his education in Mexico and that he always struggled with math, numbers, and stuff like that. But he always worked in construction and driving trucks. I feel that for someone who has always struggled with numbers, he developed his own techniques. He said that to drive the forklift to carry pallets, he not only had to count the pallets but also measure the distance between them to be able to carry and drop them off, and that he would use nearby objects to measure distance. In construction, he would use his feet and hands a lot to measure how far away things were apart… I thought this was pretty cool because he says he is bad at math, but I think what he does is math.

This reflection highlights a tension between formal educational recognition and practical mathematical expertise. Sofía's father describes himself as someone who struggled with mathematics, yet Sofía recognizes counting, spatial reasoning, measurement, estimation, and embodied strategies in his work. Through Marshall's (2023) framework, this example can be interpreted as raising questions of power and justice because it asks whose mathematics is recognized as legitimate and how schooling can shape people's perceptions of their own mathematical ability. At the same time, the example also reflects strength-based teaching because it affirms workplace and embodied knowledge as mathematical.

Expanding the Meaning of Mathematical Concepts

Students were also asked to interview their relatives and reflect explicitly on the role that zero played in their relatives' mathematical practices and understandings. Laura shared:

> Going over the number zero with my family was very surprising. The way they described it was as new beginnings. Growing up, my parents were migrant workers, and they said that every time they moved back here, and back and forth, that was their new beginning, their number zero. They said we would always have to start again, but they never saw it as something negative. They framed it as opportunities to make new friends, new memories. My grandmother described zero in a different way…in life and nature. She always lived alone, and every time a new season came, that was like a zero for her. She would change plants and do cleanings in her house. Start again. She would do this to not feel a sense of absence during the holidays, planting new trees and flowers.

This reflection expands the meaning of zero beyond a formal school-based definition. Laura's family connected zero to migration, renewal, nature, and emotional meaning, offering an interpretation rooted in lived experience rather than detached abstraction. Through Marshall's (2023) framework, this example can be read as reflecting anti-assimilationism because it resists the idea that mathematical concepts must be understood only through dominant academic meanings. At the same time, it may also reflect identity affirmation because Laura connects mathematical meaning to family history and migrant experience.

Cuentos Matemáticos

The second major assignment, completed at the end of the course, was titled *Cuentos Matemáticos*, or Mathematical Stories. This culminating project invited students to create a digital bilingual storybook that wove together mathematical content from the course with stories rooted in their families, communities, and cultural traditions. Students were required to synthesize at least six of their Padlet assignments into a cohesive narrative, highlighting the ways mathematics had been embedded across generations in their families. The project was completed using BookCreator.com, a platform that allowed students to integrate multimedia elements such as images, videos, and audio recordings alongside their written reflections (see Figure 2 for an example).

Figure 2

Sample Student Page from a Cuento Matemático Digital Storybook

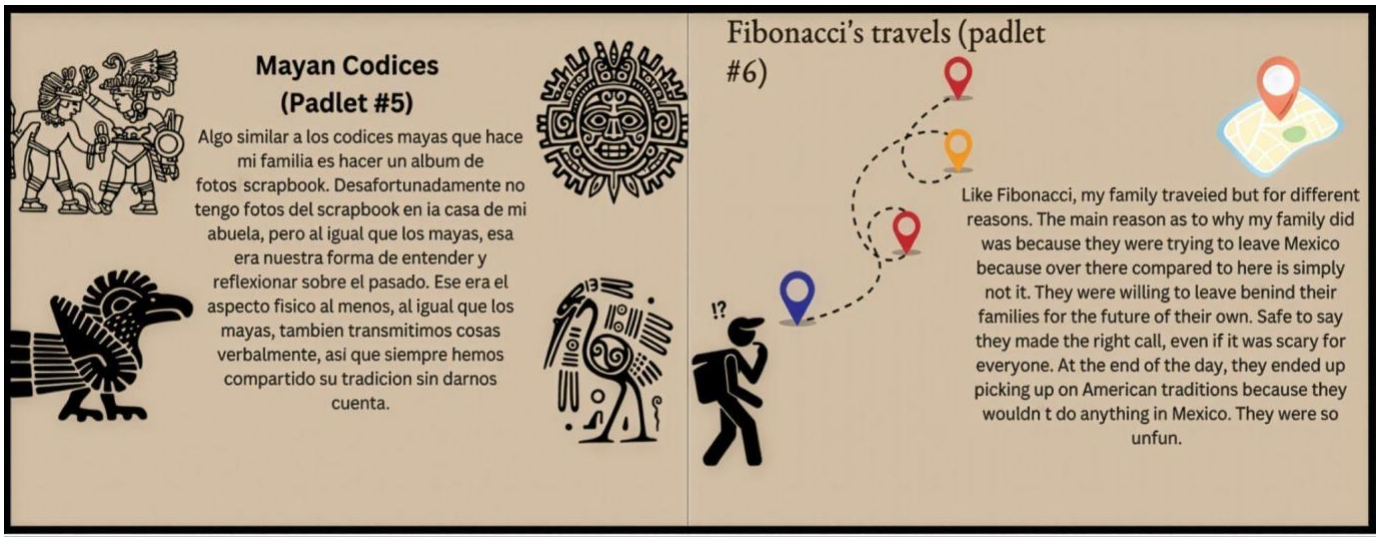
The structure of the booklet was designed to guide students through a layered process of storytelling and reflection. Students began with a cover page that introduced their project, followed by an introduction to their family to situate the narratives. The heart of the booklet asked students to transform their Padlet stories into an extended narrative of at least ten pages, connecting family practices to broader historical mathematical concepts such as zero, symmetry, or Fibonacci's sequence. The final section, a three-page reflection, prompted students to articulate how

this project influenced their understanding of their family's mathematics history, their perception of global mathematical traditions beyond Eurocentric figures, and their development as future teachers (we discuss these reflections in the next section). In this way, the assignment served both as an academic synthesis and a professional identity-building exercise. The *cuentos* were shared aloud during the final session of the semester in a communal read-aloud, transforming the classroom into a collective storytelling space. This public sharing not only honored students' identities and families but also reinforced the central course message, that is, that mathematics is not only universal and abstract, but also lived, cultural, and deeply personal.

A central feature of the project was its bilingual requirement. Students had to present their *cuento*s in both English and Spanish, either by alternating languages across sections or pairing written text in one language with oral narration in the other. This translanguaging orientation positioned bilingualism not as a hurdle but as a resource for expressing mathematical ideas authentically, consistent with approaches that view multilingual students' full linguistic repertoires as resources for learning (García & Kleyn, 2016). In practice, students often wrote their narratives in English while presenting their read-aloud portions in Spanish, and vice versa, allowing them to honor their linguistic repertoires in creative ways (see Figure 3 for an example). Because this course had an official English–Spanish bilingual designation, students were expected to engage with the course, at least in part, in Spanish, making the Spanish requirement appropriate. In other contexts, instructors might adapt the assignment to incorporate students' different home languages (e.g., Spanish, Mandarin, or Hindi) in ways that align with their course goals and local setting.

Figure 3

Example of Translanguaging in a Cuento Matemático



To receive the highest points, students had to demonstrate deep connections between their family narratives and the historical mathematical concepts studied, effectively integrate both languages throughout, and present their story in a visually appealing, multimedia-rich format. Importantly, students also had to ensure the booklet flowed seamlessly, weaving family narratives, historical mathematics, and personal reflections into a single coherent story. In what follows, we highlight selected examples from the *cuentos* to show how the assignment created opportunities for students to connect mathematics with family knowledge, bilingual expression, cultural memory, and teacher identity. We use Marshall's (2023) dimensions as interpretive lenses rather than as formal coding categories, recognizing that any example could reasonably be read through more than one dimension.

Weaving Family Knowledge into Mathematical Storytelling

Several *cuentos* foregrounded the mathematical ingenuity embedded in students' family practices. One student, for instance, described how their grandmother would regularly create intricate patterns by waving different materials together (see Figure 4). Another highlighted a father's use of geometry and spatial reasoning in construction work, noting how he measured using "body mathematics" such as hand and arm spans to guide his projects (see Figure 4). Other *cuentos* connected mathematics to budgeting, cooking, celebration, dance, and family traditions, showing how students came to recognize mathematics as something already present in their homes and communities. These examples positioned family members not simply as sources of personal stories, but as people who used mathematical reasoning in practical, creative, and context-specific ways. Through Marshall's (2023) framework, these narratives can be understood as reflecting strength-based teaching because they foreground family knowledge as a mathematical resource. They also connect to identity affirmation because students were not only identifying mathematics in family practices but also seeing those practices as part of their own mathematical inheritance.

Using Bilingual and Bicultural Narratives to Broaden Mathematical Expression

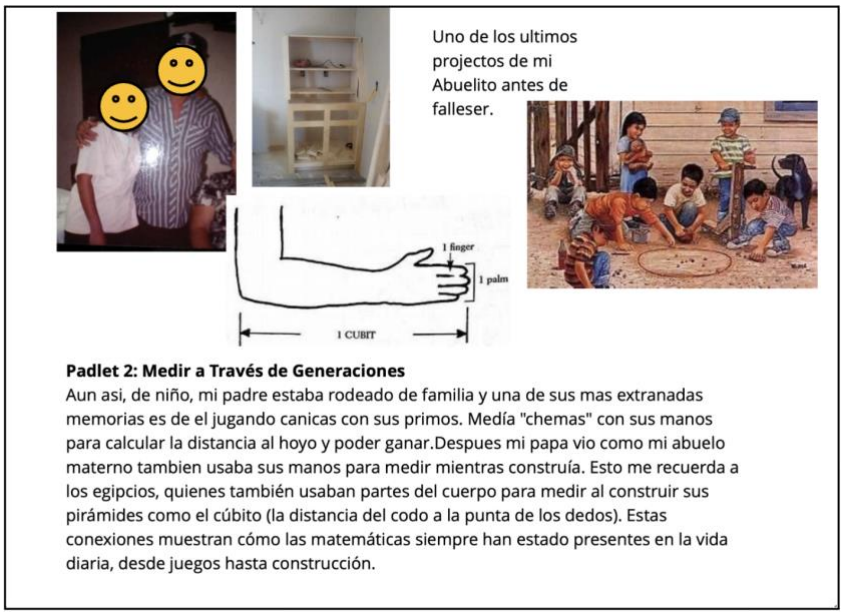
The *cuentos* also created space for bilingual and bicultural storytelling. Students wrote and presented their projects in both English and Spanish, often shifting between the two as they narrated family histories, mathematical ideas, and personal reflections. The example in Figure 2 shows how a student alternated between English and Spanish when discussing how the Padlet activities connected to his family and culture, thereby positioning translanguaging as a meaningful part of mathematical expression rather than as a departure from academic work. This bilingual structure was important because it allowed students to communicate mathematical meaning through the languages connected to their homes, families, and identities. Through Marshall's (2023) framework, these moments can be read as anti-assimilationist because they resisted monolingual definitions of mathematical communication. They also reflected identity affirmation by affirming students' bilingual and bicultural identities, as well as strength-based teaching by positioning their full linguistic repertoires as resources for mathematical meaning-making.

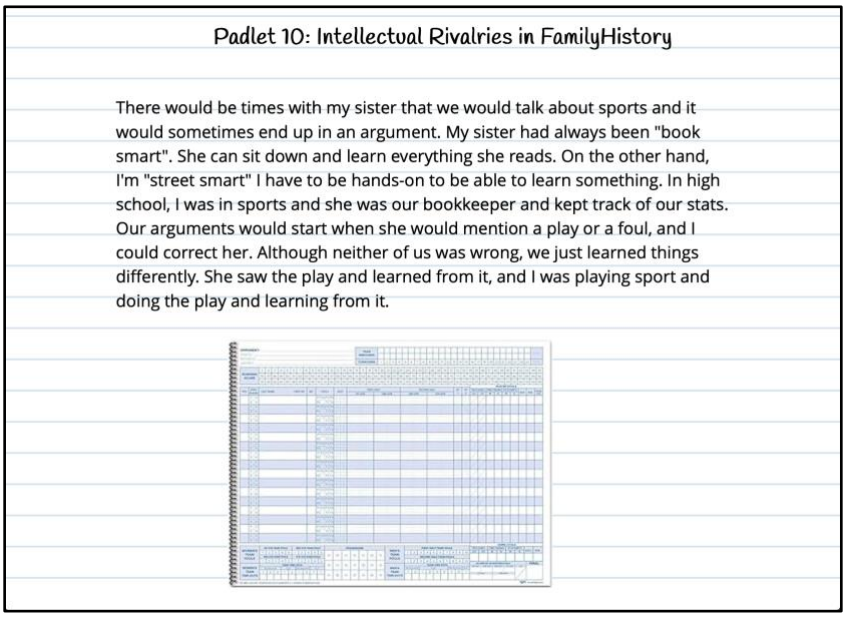
Reconsidering Whose Mathematics Counts

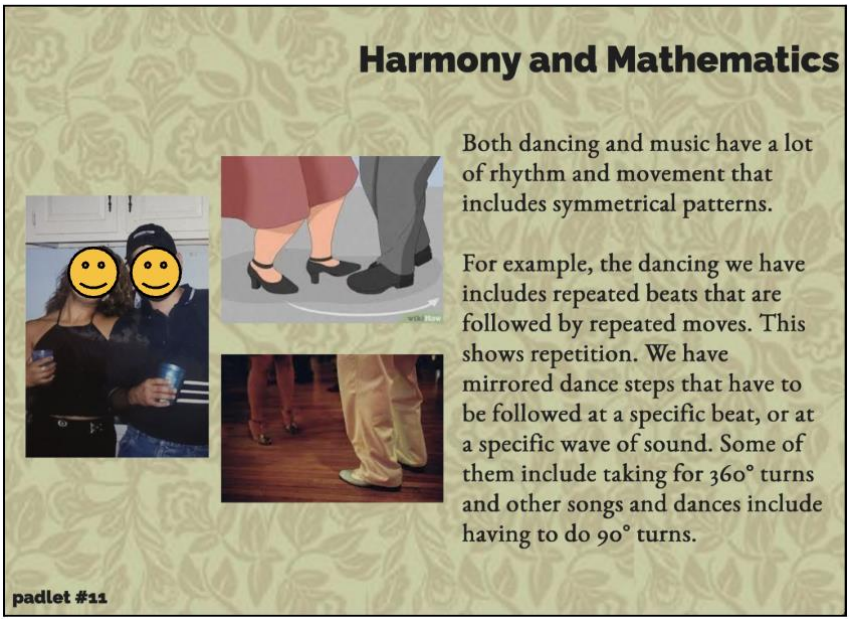
Some *cuentos* invited students to reconsider whose mathematical knowledge is recognized as legitimate. Examples involving migration, labor, and access to education showed how mathematics intersected with students' family histories and with broader questions about schooling, recognition, and expertise. One student, for example, celebrated how her parents, even though they had only received a middle school education, regularly and productively used mathematics in their daily lives, offering a counternarrative to deficit-oriented assumptions about immigrants' educational experiences (see Figure 5). This example challenges narrow views of mathematical competence by showing that mathematical reasoning can exist outside formal schooling and academic recognition. Through Marshall's (2023) framework, this example can be interpreted as raising questions of power and justice because it asks whose knowledge is recognized as legitimate mathematics. At the same time, it also reflects strength-based teaching by valuing everyday mathematical practices, and identity affirmation by positioning the student's family as knowledgeable contributors to mathematical understanding.

Figure 4

Examples of Cuentos Matemáticos with clear Mathematical Connections







Illustrative Student Reflections on Mathematics and Teacher Identity

As part of their *Cuentos Matemáticos*, students completed a three-page reflection. These reflections suggest that the course and project may have supported some students in reconsidering what counts as mathematics and how mathematics connects to their future teaching identities. Below, we discuss two recurring themes and provide illustrative student quotes.

Reframing What It Means to Know and Do Mathematics

Students' reflections suggest that the course was not only an academic exercise in learning mathematical history but also a deeply personal journey of recognition, connection, and pride. Across their *Cuentos Matemáticos*, some students emphasized how the assignments illuminated mathematics as an inseparable part of their families, cultures, and identities (see Figure 5 for examples). Carlos captured this realization vividly:

> *Este proyecto me abrió los ojos para darme cuenta de cuántas matemáticas hay realmente en nuestra vida cotidiana. Me dio oportunidad de tener varias conversaciones recordando la historia de mi familia. Junto con esto, todos pudimos ver cuándo teníamos matemáticas a nuestro alrededor sin siquiera darnos cuenta… Este proyecto hizo que las matemáticas se sintieran más personales y cercanas a mi vida.*

Carlos's reflection suggests that the project may have helped him experience mathematics as more personal and connected to everyday life. The student's phrase "*más personales y cercanas*" suggests that mathematics was no longer something owned by textbooks or distant historical figures, but something already present in family life, waiting to be named and valued. Others highlighted how the assignments deepened their intergenerational connections. Raul noted:

> *A lo largo del semestre, he aprendido mucho sobre la historia de las matemáticas en mi familia… aprender sobre los diferentes métodos que usaba para contar fue una experiencia emocionante para mí… Aprender más sobre sus [mamá] números especiales y sus experiencias jugando con sus abuelos mientras crecía profundizó la conexión que tengo con ella.*

Here, mathematics is presented as a bridge between generations, reframing grandparents' games and "special numbers" as legitimate mathematical practices. What might once have seemed like playful or idiosyncratic habits are reinterpreted as evidence of mathematical reasoning. This move reflects a core commitment of affirming heritage knowledge as intellectually rigorous.

Students also drew explicit parallels between cultural traditions and mathematical structures. For example, Andrea said:

> *El baile y la música siempre han sido parte de mi familia y mi cultura… al bailar y seguir el paso, he visto patrones de simetría y ritmo. Damos pasos y seguimos el paso para mantenernos conectados y sincronizados.*

Dance here is not framed as "art versus math," but as a context where rhythm and symmetry make sense only because of their cultural embodiment. This recognition disrupts the false binary between mathematics and creativity, showing instead how cultural practices are mathematical and how mathematics is cultural. Other narratives revealed how everyday acts of making and building illustrated deep mathematical expertise, such as Sofía's:

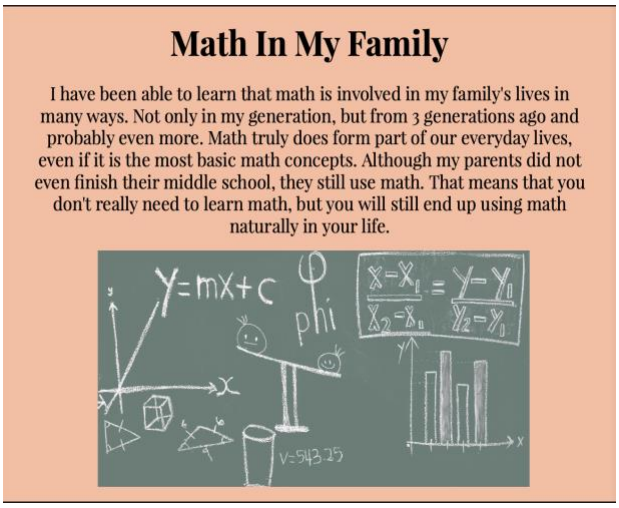
> *… mi papá también tenía una gran habilidad para las manualidades. Recuerdo que desmanteló un sillón viejo, lo deshizo por completo y luego lo rearmó cosiéndolo con ciertos patrones hasta hacer uno nuevo… un entendimiento profundo de la geometría, la simetría y la proporción.*

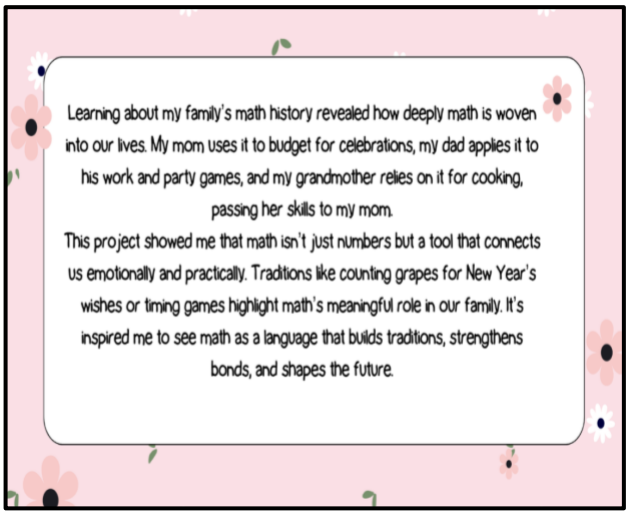
This interpretation reframes manual labor and craft not as "non-academic" but as spaces where geometry, proportion, and design are constantly at play. By elevating such practices, students began to see their families' intellectual contributions as part of a broader mathematical heritage too often ignored in formal schooling.

Lastly, language emerged as another powerful theme. Students noted that using Spanish in class and in their projects allowed them to articulate ideas with greater clarity, especially when connecting to cultural or familial knowledge. Carlos explained, "Being able to express my thoughts in Spanish helped me a lot to get my point clear." Raul similarly shared that the class pushed him to develop his Spanish while connecting mathematics to "our own stories and to cultures around the world," while Carolina described feeling more comfortable using Spanish in an academic environment. These reflections suggest that, for some students, Spanish functioned not only as a language of translation, but as a language for mathematical meaning-making. This repositioning reflects anti-assimilationism by affirming bilingual repertoires rather than minimizing them.

Figure 5

Representative Excerpts from Student Reflections from Cuentos Matemáticos





Shaping Future Teacher Identity Through Affirming Practice

A second recurring theme was that some students began to reimagine mathematics teaching as a space where culture, language, and identity could be affirmed. Rather than viewing mathematics teaching as the neutral transfer of content, selected reflections suggested that students began to consider how they might create more affirming classrooms for their own future students. Andrea reflected:

> *El proyecto en sí no necesariamente aumentó mi sentido de identidad como maestro. Fue más bien la clase en su conjunto. Ahora entiendo mejor lo que significa apreciar los diferentes enfoques culturales que adoptamos para el aprendizaje las matemáticas no pueden tomarse como una especie de materia 'universal'. Es un concepto universal que puede ser comprendido por muchas culturas e idiomas diferentes de muchas maneras diferentes.*

This reflection suggests that the course may have disrupted deficit-based notions of mathematics as abstract, culture-free, and detached. Mathematics became something to which students could claim belonging, and which they could invite their future students to belong to as well.

Others described how their perception of mathematics history itself shifted, moving beyond timelines and canonical figures, "Before this class, I saw math history as just dates and famous people. Now I see my own culture and language as part of that history, and I feel more confident about bringing that into my classroom." Here, history is reframed as a living narrative in which students' own communities and languages are protagonists. This shift may support teacher identity development by helping students imagine culture and language as resources for teaching.

For many, this course also marked the first time they had seen their cultural knowledge and bilingualism explicitly treated as assets within a mathematics setting. This recognition became a touchstone for how they imagined building their own classrooms, such as Raul: "This class helped me realize that my bilingualism is a strength in teaching mathematics. I now see how to use both languages to help students connect with the subject and feel represented." Similarly, Laura expressed: "*El impacto más grande que tuvo este curso en mí fue darme cuenta de que la historia de las matemáticas incluye a mi comunidad. Esto me dio orgullo y me hizo ver que puedo enseñar desde un lugar auténtico*."

These reflections illustrate a core goal of culturally sustaining mathematics teaching, that is affirming students' linguistic repertoires and cultural knowledge as legitimate tools for intellectual work. By repositioning bilingualism as a strength and situating cultural traditions within the history of mathematics, the course offered students a model

for equity-oriented practice. Taken together, these examples suggest that the course created opportunities for mathematical reflection and identity work.

Conclusion: Reclaiming Mathematics

The goal of this paper was to illustrate how a History of Mathematics course, often taught through Eurocentric perspectives, can be redesigned as a culturally and linguistically rich learning space for bilingual and historically underrepresented students. Grounded in CFCP (Ramirez et al., 2024) and Marshall's (2023) framework for culturally sustaining mathematics teaching, the course offered one example of how mathematics teacher educators might reject deficit views, center students' strengths, situate mathematics within questions of power and justice, and affirm students' identities. Selected reflections suggest that some students began to see mathematics not only as abstract or historically distant, but as connected to their families, languages, communities, and future teaching identities.

This redesign contributes to scholarship on the role of history in preservice teacher education (e.g., Charalambous et al., 2009; Clark, 2012; Furinghetti, 2007; Galante, 2014) by foregrounding culture, language, family, and identity as central to mathematical meaning-making. Although our example comes from a History of Mathematics course, similar principles could inform other mathematics teacher preparation contexts. For instance, instructors might invite students to connect formal tools for counting or measuring with family and community practices, such as body-based measures, household systems, or culturally specific counting strategies. We hope this illustrative paper encourages mathematics teacher educators to design courses that connect personally to students while supporting rich mathematical learning.

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Discussion and Reflection Enhancement (DARE) Post-Reading Questions

1. How, if at all, did the reading shift your view of what "rigor" can look like in mathematics learning?

2. Which student or family narrative resonated with you, and what mathematical ideas do you now notice in that narrative that you might have missed before?

3. In what ways did the described practices appear to cultivate belonging and agency for future teachers?

4. How might you incorporate features of Community- and Family-Centered Pedagogy (CFCP; Ramirez et al., 2024) and Marshall's (2023) framework for culturally sustaining mathematics teaching into your own mathematics instruction, especially in contexts outside of History of Mathematics courses?

5. What formative assessment would fairly capture cultural–mathematical thinking in your classroom, and what two criteria would make it rigorous?